

REMARKS:

Applicant requests Dunbar, issued Dec. 3, 1996, be withdrawn as post dating its priority dates of Oct. 15, 1996 and August 29, 1994. Applicant has in its above amendments incorporated significant limitations to the base claims, claiming subject matter disclosed in parent applications and brought forward here, intending to be directly responsive to the commentary in the cited office correspondence about quantifying the minimum density weave to which the claims apply. Applicant has further limited the base claims to comprise staple fibers, in contrast to the continuous length filament yarns implied in Dunbar. These amendments, for which there is ample support in the specification, should place the claims in condition for allowance. Applicant respectfully requests consideration thereof and comments further below.

Dunbar postdates Applicant's priority dates:

The effective filing date of an application is determined in accordance with MPEP § 706.02. By a previous amendment, this application claims priority to ser. no. 09/037,918, filed March 10, 1998, now U.S. Pat. No. 5,976,996, hence to ser. no. 08/729,926, filed Oct. 15, 1996, now U.S. Pat. No. 5,837,623, hence to ser. no. 08/297,593, filed Aug. 29, 1994, now U.S. Pat. No. 5,565,264. A supplemental declaration is attached ~~or will follow immediately hereafter~~, in this regard. Dunbar's '628 issued Dec. 3, 1996, post dating Applicant's priority dates of Oct. 15, 1996, and Aug. 29, 1994. Applicant herein requests Dunbar be withdrawn as prior art on this basis, thus curing the pending 35 USC 103 rejection.

Dunbar contrasted:

Notwithstanding the request to withdraw Dunbar, applicant further addresses Dunbar. The above noted office correspondence cites chiefly to Dunbar's '628 with respect to rejections in this and related co-pending applications. Applicant first addresses the general differences between the prior art of Dunbar and the Applicant's invention as presently claimed.

Yarn filaments or fibers are normally twisted together to produce a coherent yarn structure which facilitates handling and weaving. However, applying excessive twist to the yarn fibers weakens the yarn. In contrast to these general statements, the Dunbar disclosure is about low density, specifically ballistic resistant weave fabrics and how the entanglement of continuous filament yarn can be used to avoid excessive twist for weaving performance, while still offering ballistic performance. Dunbar specifically discloses a balanced, taped out, loosely woven taffeta construction, as illustrated by his examples of 56 x 56 count 215 denier Spectra. As will be readily apparent to those skilled in the art, Dunbar is inherently exclusively confined to continuous filament yarns. He teaches a maximum twist of 2.5 turns per inch, and a preferred 0.5 turns per inch, to avoid the fuller twisted, more round yarn structure and other short comings of heavily twisted filament, to obtain the taped out yarn profile described in his specification.

Dunbar's disclosure is distinctly void of consideration of the high density weave fabrics discussed in this Applicant's disclosure, cited examples of which included 90 x 88 and 130 x 86 weaves using 200 denier warp and 200 denier fill yarns, and 100 x 68, 110 x 67, and 130 x 65 weaves using 200 denier warp and 400 denier fill yarns.

The Dunbar work relates to prior, loose weave, ballistic-only art where a yarn is taped out or has a width greater than its height. This flat taped yarn is made more weavable by the entanglement process that he teaches. It is instructive to view his micrographs showing yarns of his loosely woven fabrics that are spread out to form cross section structures where the width is much greater than the height. The intersections of the woven fabric are remarkably open, as a result of the yarn geometry, suitable for Dunbar's ballistic-only purposes.

All Dunbar constructions allow for maximum width to high for the yarn cross section and fabric he is defining. This is dramatically opposed to this Applicant's densely woven constructions using staple yarns, intended to provide stab, cut, and ballistic resistance, in which width to height of the yarn cross sections are severely limited and very tight intersections are inherent in the fabric weave because of the yarn weight and high density of the yarn spacing.

In particular, the Applicant's claims as herein amended are patentably distinguished from Dunbar in that all are limited to fabrics with high density weaves of at least 70 ends per inch in at least one direction, and yet further distinguished by using yarns made of staple fibers, which are relatively short yarn fibers or filaments as are fully described in its specification. This densely woven construction of high tenacity staple fibers offers a useful, combination of cut, stab and ballistic protection not achievable in the ballistic-only, relatively loose weave prior art of Dunbar and less costly than using continuous filament yarns of the same material. The staple yarns described and claimed by this Applicant can not even be entangled as described in Dunbar. Nor can staple fiber be processed into yarn without having a twist much greater than about 2.5 turns per inch, the maximum permitted by Dunbar.

There is a threshold of about 70 ends per inch that is well recognized in the industry and referenced in the Applicant's specification as dividing a different and vastly more difficult weaving domain from the traditional, lower density weaves such as the flat weaves illustrated in the Dunbar specification. The geometry of the warp and fill intersection and the yarn cross section in high density weave fabrics, which are well illustrated in this Applicant's specification, are remarkably different and more challenging to produce than are weaves of lesser densities as in Dunbar. The likely assumptions that could be attributed to one skilled in the art without inventive effort, from the Dunbar-type low density weaves and yarn entanglement schemes, do not extend to the high density weave and staple yarn arena. In particular, the teachings of Dunbar are inapplicable to and not obviating of the Applicant's staple fiber claims as amended, except by inaccurately associated generalities provoked by impermissible hindsight.

For example, in puncture resistant art, the mobility of the yarns to be displaced laterally in the fabric, or to slide aside under impact of a sharp penetrator, is a vital characteristic that must be controlled. The taffeta construction has ballistic performance because of the relatively large size of the bullet penetrator as compared to the weave density. However taffeta constructions do not even contemplate control of the sliding of yarns, as is readily evident in the inadequate density of spacing of the yarns most noticeable at the intersections of his fabric photos.

Dunbar only teaches taffeta constructions. Traditional taffeta design is based on a flat yarn, open weave precept to allow the maximum spread of the yarns used. This gives the softest thinnest fabric for a given weight of fiber. All the Dunbar variations in fiber type, denier, denier per filament, entanglement and weave only pertain to loosely woven fabrics. Dunbar does not apply to tightly woven staple yarn fabrics. Applicant requests the claims be reconsidered in light of these remarks and that rejections based on Dunbar be withdrawn.

Responding to the office correspondence directly:

Applicant herein summarizes and responds to the office correspondence dated 07/08/02:

The Office acknowledged papers #10-12, the extension of time, the amendment, and the revocation of power of attorney, all of 4/3/02; and paper #13, letter of acceptance of the change of address and new power of attorney of 4/4/02; paper #14 Terminal Disclaimer of 4/3/02; and paper #15 IDS of 5/16/02.

The Office withdraws new claim 16 as directed to a non-elected invention. Applicant acknowledges without traverse.

35USC103 rejection:

The Office rejects claims 1, 3, 4, 6-8, 10-13 under 35 U.S.C. 103(a) as unpatentable over Dunbar's '628, maintaining substantially its position as in paper #9, page 6, para. 20. In part, the Office alleges there to be no quantification in the claims of the densely interwoven yarns described by the Applicant, and nothing in the claims regarding the shape of the warp cross section as discussed by the applicant and shown in the figures, by which the prior art can be properly distinguished.

Applicant invokes its prior comments, including its request that Dunbar be withdrawn and post dating the priority dates of this application, and states further that it has herein amended independent claims 1 and 6 to incorporate the limitations of densely interwoven yarns described

in its specification and figures. It has further limited these claims, incorporating the shorter staple fibers and yarns which require twist, *in opposition* to the teaching of Dunbar. Notwithstanding the request to withdraw Dunbar, these limitations should otherwise cure the rejection, placing these claims in condition for allowance, and Applicant respectfully requests reconsideration of same.

In claim 4, Applicant has further limited claim 1 to include "stretch broken" staple fibers, again as is fully described in the Applicant's specification, and is incompatible with the teaching of Dunbar. Applicant requests reconsideration on this basis.

The remaining claims 3, 7, 8, 10 - 13, being dependent on allowable base claims 1 or 6, should be likewise be allowable, thereby curing this rejection. Applicant respectfully requests reconsideration of these claims as well.

The Office rejects claims 14 and 15 under 35 USC 103(a) as unpatentable over Dunbar in view of Harpell's 012. Applicant invokes its prior comments about the claims as amended and Dunbar. Applicant has already distinguished its other claims and its art of high density weave stab, cut and ballistic resistance staple fabrics from that of Dunbar. Claims 14 and 15 are dependent claims to respective base claims 1 and 6, adding the limitation of "a repeatedly interrupted coating of epoxy resin material providing flexure points to the fabric substrate at the areas of interruption." The Applicant's Fig. 8 embodiment illustrates and is explained in the specification at page 8, line 13 forward, that for *cutting resistance* a high modulus lamination epoxy is applied in a grid-like pattern of "islands" separated by uncoated "streets", where the islands provide high, in-plane resistance to cutting by the flats of a knife edge, and the streets or gaps between the islands provide space for bending and flexing of the fabric.

Applicant invokes its remarks of its correspondence mailed Aug. 27, 2001, re Harpell, and remarks further. Harpell, issued in 1983, discloses an ultra high molecular weight polyethylene fibrous layer or polypropylene network as an impliedly rigid structural element for making ballistic type protective structural elements. It predates the present era of high density fabric weaves. The 3 inch by 3 inch plaques of Harpell comprise layers of protective fabric or

unwoven filaments interspersed with layers of polyethylene film. The plaque is then pressure treated at somewhat elevated temperature to form a thermally bonded, impliedly rigid, composite plate of film and fiber for *ballistic resistance*. The disclosure makes no suggestion or comment as to flexibility or cutting resistance of the plaques or of any similarly constructed articles.

When applying 35 U.S.C. 103, the following tenets are applied: (a) the claimed invention must be considered as a whole; (b) the references must be considered as a whole and must suggest the desirability and thus the obviousness of making the combination; (c) the references must be viewed without the benefit of impermissible hindsight vision afforded by the claimed invention; and (d) reasonable expectation of success is the standard with which obviousness is determined. *Hodosh v. Block Drug Co., Inc.*, 786 F.2d 1136, 1143 n.5 (Fed. Cir. 1986).

Applicant respectfully asserts that while reasons can be speculated for combining Dunbar's entangled yarn taffeta construction with Harpell's rigid ballistic composite plaques, nothing in the combination would give rise without inventive effort to a reasonable expectation of achieving the stab/cut/ballistic resistant, high density weave, flexible, staple substrate that is disclosed and claimed by this Applicant.

Also, with Dunbar withdrawn as postdating Applicant's priority dates, Harpell is inadequate by itself to support a 35 USC 103 rejection of the pending claims. Finally, claims 14 and 15 being further limiting of and dependent on allowable claims 1 and 6, should be allowable for at least that reason. Applicant requests reconsideration thereof.

Claim 16 having been withdrawn, Applicant herein adds new dependent claims 17 - 22, dependent on allowable base claims, supported by the specification, no new matter being added, and which are thereby allowable. Applicant respectfully requests consideration thereof.

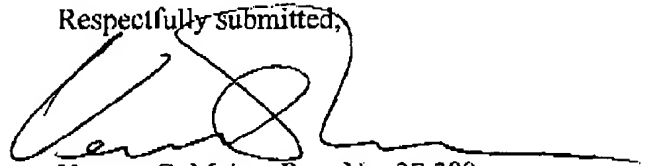
Applicant believes the claimed priority dates and amendments to place the claims in condition for allowance, comporting with the comments of the Office correspondence, and respectfully requests reconsideration for that reason. No new matter is added. The Applicant's remarks and declaration are intended to provide a further record of its position in support thereof.

Priority Claim (Box #14 of Office Action Summary)

Applicant wishes the Office to acknowledge the claim of priority under 35 USC Section 120 and/or 121. The present application claims priority, as a ^{DIVISIONAL APPLICATION} continuation in part, to U.S. Patent Application Serial No. 09/037,918 filed March 10, 1998 (issued patent no. 5,976,996), which is a continuation in part to U.S. Patent Application Serial No. 08/729,926 filed October 15, 1996 (issued patent no. 5,837,623), which is a continuation in part to U.S. Patent Application Serial No. 08/297,593 filed August 29, 1994 (issued patent no. 5,565,264). (vc)

Attached hereto is a marked-up version of the changes made to the specification and claims by the current amendment. The attached page is captioned "Version with markings to show changes made." Applicant invites the Examiner to contact the undersigned agent for discussion and prompt resolution of any remaining issues.

Respectfully submitted,



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VERSION WITH MARKINGS TO SHOW CHANGES MADE

In the Claims:

Claim 1 has been amended as follows:

1. (Amended) A protective fabric substrate for protection against puncture, penetration and/or ballistics comprising:

a plurality of warp yarns densely interwoven with a plurality of fill yarns; wherein the denier of the fill yarn is [greater than] at least equal to the denier of the warp yarn, at least some of said yarns comprise staple fiber, and at least one of warp and fill directions has greater than 70 ends per inch.

Claim 4 has been amended as follows:

4. (Amended) The protective fabric substrate as claimed in claim 1 [wherein at least some of the yarns are staple yarns] said staple fibers comprising stretch broken fibers.

Claim 6 has been amended as follows:

6. (Amended) A protective fabric substrate for protection against puncture, penetration and/or ballistics comprising:

a plurality of warp yarns densely interwoven with a plurality of fill yarns; wherein a warp crimp is greater than a fill crimp; and wherein a denier of the fill yarn is greater than the denier of the warp yarn, at least some of said yarns comprise staple fiber, and at least one of warp and fill directions has greater than 70 ends per inch.

Claims 17 – 22 are new